

1 CLAIMS:

2 1. A method of removing at least some of a material from a
3 semiconductor substrate, comprising:

4 feeding a feed gas through an ozone generator to generate ozone
5 from the feed gas; the feed gas comprising at least 99.999% O₂ (by
6 volume); and

7 contacting the ozone or a fragment of the ozone with a material
8 on a semiconductor substrate to remove at least some of the material
9 from the semiconductor substrate.

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11 2. The method of claim 1 further comprising irradiating at least
12 some of the ozone with ultraviolet light prior to the contacting.

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14 3. The method of claim 1 further comprising irradiating at least
15 some of the ozone with ultraviolet light proximate the material.

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17 4. The method of claim 1 wherein the material on the
18 semiconductor substrate is photoresist.

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20 5. The method of claim 1 further comprising mixing the ozone
21 with water vapor prior to the contacting.

1 6. The method of claim 1 further comprising mixing the ozone
2 with an organic solvent vapor prior to the contacting.

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4 7. A method of removing at least some of a material from a
5 semiconductor substrate, comprising:

6 feeding a feed gas through an ozone generator to generate ozone
7 from the feed gas; the feed gas comprising O₂ and less than or equal
8 to 0.001% N₂ (by volume); and

9 contacting the ozone or a fragment of the ozone with a material
10 on a semiconductor substrate to remove at least some of the material
11 from the semiconductor substrate.

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13 8. The method of claim 7 further comprising irradiating at least
14 some of the ozone with ultraviolet light prior to the contacting.

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16 9. The method of claim 7 wherein the material on the
17 semiconductor substrate is photoresist.

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19 10. The method of claim 7 further comprising mixing the ozone
20 with water vapor prior to the contacting.

1 11. The method of claim 7 further comprising mixing the ozone
2 with an organic solvent vapor prior to the contacting.

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4 12. A method of removing at least some of a material from a
5 semiconductor substrate, comprising:

6 forming a mixture of ozone and organic solvent vapors in a
7 reaction chamber; and

8 contacting at least some of the ozone and solvent vapors with a
9 material on a semiconductor substrate to remove at least some of the
10 material from the semiconductor substrate.

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12 13. The method of claim 12 wherein the material on the
13 semiconductor substrate is photoresist.

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15 14. The method of claim 12 wherein the material on the
16 semiconductor substrate is photoresist; wherein the semiconductor
17 substrate comprises Al_2O_3 ; and further comprising exposing at least some
18 of the Al_2O_3 to the ozone during the contacting.

1 15. The method of claim 12 wherein the material on the
2 semiconductor substrate is photoresist; wherein the semiconductor
3 substrate comprises platinum; and further comprising exposing at least
4 some of the platinum to the ozone during the contacting.

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6 16. The method of claim 12 further comprising providing a
7 reservoir of volatile organic solvent within the reaction chamber and
8 forming the solvent vapors from the volatile organic solvent.

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10 17. The method of claim 16 wherein the volatile organic solvent
11 is a liquid.

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13 18. The method of claim 16 wherein the volatile organic solvent
14 comprises acetone.

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16 19. The method of claim 16 wherein the volatile organic solvent
17 consists essentially of acetone.

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19 20. The method of claim 16 wherein the volatile organic solvent
20 comprises cyclohexanone.

1 21. The method of claim 16 wherein the volatile organic solvent
2 consists essentially of cyclohexanone.

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4 22. The method of claim 16 wherein the volatile organic solvent
5 comprises a mixture of cyclohexanone and PGMEA.

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7 23. The method of claim 16 wherein the volatile organic solvent
8 comprises propylene glycol.

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10 24. The method of claim 12 further comprising providing a
11 reservoir of volatile organic solvent within the reaction chamber and
12 heating the volatile organic solvent to form the solvent vapors from the
13 volatile organic solvent.

1 25. A method of removing at least some of a material from a
2 semiconductor substrate, comprising:

3 forming a mixture of ozone and organic solvent vapors in a
4 reaction chamber;

5 irradiating at least some of the ozone with ultraviolet light to form
6 ozone fragments from the ozone; and

7 contacting at least some of the ozone fragments and solvent vapors
8 with a material on a semiconductor substrate to remove at least some
9 of the material from the semiconductor substrate.

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11 26. The method of claim 25 wherein the material on the
12 semiconductor substrate is photoresist.

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14 27. The method of claim 25 further comprising providing a
15 reservoir of volatile organic solvent within the reaction chamber and
16 forming the solvent vapors from the volatile organic solvent.

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18 28. The method of claim 27 wherein the volatile organic solvent
19 is a liquid.

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21 29. The method of claim 27 wherein the volatile organic solvent
22 comprises acetone.

1 30. The method of claim 27 wherein the volatile organic solvent
2 comprises cyclohexanone.

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4 31. The method of claim 27 wherein the volatile organic solvent
5 comprises a mixture of cyclohexanone and PGMEA.

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7 32. The method of claim 27 wherein the volatile organic solvent
8 comprises propylene glycol.

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10 33. The method of claim 25 further comprising providing a
11 reservoir of volatile organic solvent within the reaction chamber and
12 heating the volatile organic solvent to form the solvent vapors from the
13 volatile organic solvent.

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15 34. The method of claim 25 wherein the material on the
16 semiconductor substrate is photoresist; wherein the semiconductor
17 substrate comprises Al_2O_3 ; and further comprising exposing at least some
18 of the Al_2O_3 to the ozone fragments during the contacting.

1 35. The method of claim 25 wherein the material on the
2 semiconductor substrate is photoresist; wherein the semiconductor
3 substrate comprises platinum; and further comprising exposing at least
4 some of the platinum to the ozone fragments during the contacting.
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